Annual Report of the Board of Public Health Works, Province of Bombay

For the Year 1939-40

BOMBAY
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ANNUAL REPORT OF THE BOARD OF PUBLIC HEALTH WORKS, PROVINCE OF BOMBAY.

For the year ending 31st March 1940.

The Public Health Branch was re-organized on the 1st April 1933 and became purely consultant. In consequence, the functions, powers and constitution of the Board of Public Health Works in the Province were also reviewed.

2. The official and non-official membership of the Board was organised as under :—

(1) The Commissioner, Central Division ...	PRESIDENT.
(2) The Secretary to Government, General Department.	MEMBERS.
(3) The Chief Engineer and Secretary to Government, Public Works Department.	
(4) The Director of Public Health for the Government of Bombay.	
(5) The Consulting Surveyor to Government.	
(6) The Consulting Public Health Engineer to Government.	
(7) & (8) Two non-officials.	
(9) The Deputy Secretary to Government, Public Works Department, Irrigation & Railways.	MEMBER AND SECRETARY, (from 20th December 1939).

The personnel of the Board is given in Appendix I.

3. The functions and powers of the Board stand as under :—

Functions.

(1) The Board is to advise Government on all general questions of sanitary policy including the formulation of the principles to be followed for the healthy and orderly growth of inhabited areas and the preparation and submission to Government of Public Health engineering type designs. The Board will also be consulted by Government regarding large individual schemes of sanitary improvements.

(2) The Board is to report to Government upon such matters as may be referred to it by Government for opinion, but is free to represent to Government any matter which it recognises as of importance.

(3) The Board is to consider measures for effecting improvements in sanitation in the Province and to give help and advice to local bodies on public health matters.

(4) The Board is to scrutinise public health improvement schemes from all aspects including finance, with a view to recommending execution by the local body concerned with or without help from Government.

4. *Powers of the Board.*

The Board is empowered to accord—

(1) Approval to the preliminary investigations of sanitary schemes up to any amount.

(2) Approval to the preparation of detailed plans and estimates.

(3) Administrative approval to works costing not more than Rs. 50,000 in the case of projects which are proposed to be executed by the local body through the agency of the Government, Public Works Department.

In the case of works proposed to be executed by the local body through its own agency, the Board shall be competent to give administrative approval without limit.

(4) Preliminary approval to sanitary schemes to be carried out from provincial revenues up to any amount.

(5) Sanction to non-recurring grants up to Rs. 10,000 in each case from such sums as may be placed at the disposal of the Board by Government for minor sanitary schemes from time to time.

All cases which are administratively approved by the Board are to be reported to Government with a brief description of the works and intimation concerning the agency which the local body proposes to employ to execute the work.

The Board discharges its functions at meetings held at intervals, any specially urgent questions being dealt with by circulation. The Board's executive functions are carried out by the Consulting Public Health Engineer to Government.

5. The duties of the Consulting Public Health Engineer are to examine the schemes technically, to investigate the details on site, to inspect works under execution and to advise local bodies in respect of their sanitary schemes. All public health schemes carried out from loan funds are scrutinised by the Consulting Public Health Engineer for the Board in respect of their technical details, and the schemes are administratively approved or recommended to Government for approval by the Board before construction is undertaken.

An application for raising a loan either from Government or in the open market in connection with a public health scheme is entertained only after the scheme has been approved administratively and sanctioned technically by the competent authority concerned.

Note.—Schemes costing not more than Rs. 50,000 can be approved administratively by the Board of Public Health Works and sanctioned technically by the Consulting Public Health Engineer to Government. Those costing more than Rs. 50,000 require the administrative approval and the technical sanction of Government.

Public Health works financed from loans raised by local bodies are, if executed by their own qualified agency, subject to control and inspection by the Consulting Public Health Engineer to Government according to rules framed under the Local Authorities Loans Act. But where the local body does not either possess the requisite staff, or employ a qualified agency capable of carrying out the work on approved lines, it is open to Government to impose a condition that the work should be carried out by the agency of the Public Works Department.

6. The Public Health Engineering Branch was again re-organized from 1st December 1938. The Poona Water Works Division and the Government Central Store and Workshops were converted into sub-divisions and brought under the administrative control of one executive head "The Consulting Public Health Engineer to Government."

The Sub-divisional Officer, Poona Water Works Sub-Division, has now charge of—

(1) The Poona Water Works Pumping Station.

(2) The Holkar's Bridge Pumping Station.

(3) Pashan dam and filters.

(4) Kirkee Water Works.

The Sub-divisional Officer, Dapuri Sub-Division, has now charge of—

(1) Workshop manufacture at Dapuri.

(2) Training of apprentices.

(3) M. and R. of Public Works Department surplus machinery.

(4) Inspection and repairs to Government road rollers in the Province.

The Consulting Public Health Engineer, in addition to his normal duties, exercises direct control over—

(1) Administration of all Public Health (water supply and drainage) works in the Poona area.

(2) Supervision and maintenance of the Government sewage pumping station near Bahiroba Nala, Poona, and the rising main line as far as distributary No. 5 in Mutha Canal.

(3) Realization of share cost of capital advanced, interest and running costs from local bodies.

(4) Alandi Water Works.

(5) Matheran Water Works.

(6) Ambernath and Badlapur Water Works.

(7) Advising on mechanical questions and carrying out inspections and tests on pumping plants all over the Province.

(8) Boring works section situated in Ahmedabad and now working in Gujarat.

7. Only one meeting of the Board was held during the year under report, viz. on the 16th October 1939. The projects which came up for the Board's approval subequently were dealt with by circulation.

The schemes that were finally approved by the Board are tabulated in Appendix II.

8. The Consulting Public Health Engineer himself or through his assistants inspected all the Public Health works carried out by local bodies in the Province. A large amount of preliminary work by way of inspection and advice has to be carried out and rough costs of schemes given before a request actually emanates from a local body for the preparation of plans and estimates of any new project. The local bodies concerned are in many cases not able to give effect at once to the advice tendered as they have always to depend upon the state of their finances at the time. The volume of work initiated in the year under report as reflected by the permissions granted for the preparation of plans and estimates, and approvals accorded to projects by the Board, is therefore small, when compared to the preliminary work actually undertaken.

9. The following among other places were visited by the Consulting Public Health Engineer during the year and advice offered by him in respect of their Public Health works. His report is as under :—

NORTHERN DIVISION.

Ahmedabad.

With the rapid development of this important industrial centre, it becomes increasingly difficult to cope with the demand for water especially in the hot weather. The 24" diameter porous pipe gallery installed as an experimental measure some years ago to collect more water is now overloaded and the collecting area must be increased. The Municipality has been advised to lay another 30" diameter collecting main and to install collecting roses fixed on

to C. I. tees 15″ off 30″ on the main at suitable places, to increase the area of infiltration and to exploit cones of depression of the subsoil. Water supply is also supplemented by sinking several borings about the town, but as the bore water is slightly brackish, it is therefore mixed with river water when delivered to the public. Bore hole water is very suitable for manufacturing purposes in the Mills and is utilised freely for this purpose. The Municipality have been advised to call in the Director of Hydrodynamical Survey to advise on the best method of training the river Sabarmati to flow alongside the left bank as it used to do. This is a most important matter. Other means of increasing the supply have also been suggested.

During the year under report three additional underground storage tanks with a capacity of 3 million gallons were constructed, besides certain other minor works. For improvements of water supply in suburbs, additional tube wells were put down at Gomtipur, Raikhad, Jamalpur Town Planning Area and Saraspur, along with their independent pumping units and overhead steel tanks on steel legs, 40 feet high. Also, a considerable length of piping was laid to improve the distribution system.

The works of main sewers, main pumping stations, grit chambers and interstage pumping stations at Gomtipur, started during the previous year, were in progress for the Suburban Drainage scheme.

Bandra.

The complete sewerage of the town has been in progress. 95 per cent. of the sewer lines in Bandra have been completed; also Khar sewers, excepting a length of 2,800 feet. The construction of the common disposal works for Bandra, Khar, Santa Cruz and Kurla, which was expected to be completed during the year was held up owing to delay in payment of the Kurla Municipality's contribution. The mechanical equipment of the Simplex Continuous Flow Settling Tank has been received and construction should proceed expeditiously next year. A complete project for the drainage of Danda and Santa Cruz areas has been approved by the Board of Public Health Works and is awaiting execution.

It is very satisfactory to note that the mortality of Bandra is only 17 per 1,000—very satisfactory when compared with other areas nearby. With the sewerage scheme completed, it is hoped that the town will improve very much in point of sanitation.

The total gross expenditure incurred during the year on Bandra and Khar drainage was Rs. 2,49,648.

Borsad.

The water supply to Borsad has been entrusted to a private company and it is regretted to note that a certain amount of friction has developed between the private company and the municipality.

If the municipalities and private water companies cannot co-operate together in a proper spirit, there is little hope for other works being entrusted to private enterprise. In England a large number of water supplies are controlled by private companies and the latter have found that it is good business to invest in water supplies and to give their best service. The Borsad Municipality contends that with the growth of extensions, the town does not receive an adequate potable supply and the company maintains that supply is delivered according to the agreement. But the fact remains that the water supply scheme drawn up for Borsad is fundamentally defective, to remedy which suggestions as noted below were offered :—

(*i*) A yield test of the supplying well should be taken to ascertain whether it could meet the present and prospective requirements.

(*ii*) High power engines should be installed to pump up additional supply, there being no stand-by plant.

(*iii*) Adequate storage capacity should be provided by constructing an additional service reservoir.

(*iv*) The existing distribution system should be overhauled and C. I. pipes of adequate sizes, in place of the existing wrought iron pipes, should be laid to ensure a better and regular supply.

Above all, the Municipality should first arrange for an effective drainage system before any extensions to water supply are contemplated, as otherwise, the health of the town would be endangered.

Kapadwanj.

Infiltration works consisting of a porous pipe gallery laid in the river Varashi now fail to give the required purification and yield. It is choked up with penetrating fine silt and has become totally impervious. As a tentative measure, water is admitted directly from the river to the intake chamber and taken to the jack well and chlorinated. The result of analysis of the water is bad. The Municipality propose to have low and high lift pumps together with the installation of a purification plant consisting of settling tanks and filters. Another alternative scheme that engages the attention of the Municipality is the sinking of artesian or sub-artesian bore-holes. The depth together with the quality and quantity of water being problematical, it is risky to invest capital and leave out an assured source of supply from the river Varashi. It is hoped that the Municipality will shortly entrust the preparation of the filtration scheme to Government agency and find requisite funds for executing the scheme from their accumulated depreciation fund.

Kurla.

The drainage work has been in progress and a net expenditure of Rs. 22,894 was incurred during the year under review. The whole work is expected to be completed during 1940-41. Besides the main drainage scheme under execution by the Executive Engineer, Thana Division, the Municipality also constructed some surface drains during the year.

Rander.

The town is supplied with water from the Surat municipal water main *via* a meter. The supply received is about 150,000 gallons per day or about 12½ gallons per head per day. The water pressure is generally very low and great hardship is felt especially in summer months for want of an adequate supply of water. It is hoped that when the new 38″ diameter Hume water main has been laid from Waracha to Surat, the water pressures on the branch main leading the supply to Rander would appreciably increase and give a better water supply to the town.

Surat.

With the growth of population and an ever growing demand for more water, the Municipality have rightly decided to enlarge their 22″ cast iron supply main from Murda Gate to the pumping station, by 38″ diameter Hume steel pipes to a length of 16,300 feet for the improvement of pressures and discharges in the distribution system. The principal trunk water supply main from Murda Gate to Athwa Gate had already been enlarged. The cost of the work is estimated at Rs. 4,90,000. The work of laying the pipes has been started. The scheme is wholly financed from municipal revenues.

A comprehensive underground drainage scheme for the town has been administratively approved and is waiting to be financed.

CENTRAL DIVISION.

Ahmednagar.

The town is known to suffer long for want of an adequate and clean water supply. It has been brought home to the Municipality that their storage for water supply is at present adequate, but that they must introduce purification works to clean the water, as the present methods are faulty and result in the water being charged with chemicals. The Municipality has paid the necessary centage charges for preparation of the filtration scheme and also contributed a part towards the preparation of their sullage disposal scheme. The projects are under preparation with the Executive Engineer, Ahmednagar Division.

Amalner.

Progress on the main drainage scheme has been held up for various reasons. The Municipality has already constructed two main open collecting drains alongside the two principal roads. The sullage water from these drains is tapped through catchpits and taken to a 12″ diameter sewer laid up to the proposed pumping station. It is now let into the bed of the river through an overflow pipe rendering the river insanitary and the drinking water of the down-stream villages unpotable. It was pointed out to the Municipality that the scheme for pumping station and disposal works, already sanctioned, should be taken in hand immediately and completed, as this is the only economical means to render the town sanitary and without detriment to other localities.

Barsi.

In Barsi town certain localities, e.g., Kasba, are very deficient in water supply. The Consulting Public Health Engineer proposed installation of subsidiary elevated tanks to be filled during non-service hours by direct mains. This was considered beyond the municipal means at that time. The Municipality suggested a direct 9″ Hume pipe main from the service reservoir to the Kasba locality which suffered most from water shortage. This was permitted by the Consulting Public Health Engineer to Government under the circumstances. The Municipality rectified the complaints of deficient water supply in the Kasba locality by laying the main at a cost of Rs. 17,200. This started complaints in other parts, such as Cud Peth. The supply pipe, 10″ diameter from the Pathri storage reservoir, is too small to cope with the water required and should be enlarged as advised.

Dhulia.

The existing water supply works have been in existence for over 40 years and the Municipality cannot draw more water than 3½ lakhs gallons a day from these depreciated water works. The supply is thus inadequate to meet the growing needs of the town. A project was therefore prepared to obtain the balance of require-ments (8 lakhs gallons daily) from an infiltration porous pipe gallery laid in the Panjra river. This scheme has been entrusted to the Executive Engineer, Khandesh Division, for execution. During the year under report, the work of laying 18″ Hume steel rising main, jack well and connecting pipe has been completed. The expenditure incurred was Rs. 69,238 net.

Jalgaon.

With the introduction of an improved and plentiful water supply to Jalgaon, the attention of the Municipality has been directed to provide the town with an up-to-date underground system of

drainage. During the year under report, the Municipality entrusted preparation of the drainage scheme to the Government agency and the project is under preparation with the Executive Engineer, Khandesh Division.

Kirkee.

The existing Kirkee water works are being increased from 1½ million gallons per day to 4 millon gallons per day and work is now in progress for the augmentation of the existing water works near the Holkar's bridge. The estimated cost of the improvements amount to Rs. 7,91,789. The new extensions provide for the laying of about 5 miles of 18″ diameter Hume pipes which will convey the water from the Mutha Canal in Poona to the new water works in Kirkee. The purification works embody a new design for their settling tanks; instead of the usual rectangular settling tank, a new round clarifier tank, 75 feet in diameter, is being constructed. This design is based on a similar one erected in Alexandria (Egypt) and tests have shown that this type is far superior to the old types usually installed in this country. The new purification works include an aeration cascade, a revolving flocculator, one large clarifier tank, rapid gravity filters, an underground reservoir with electric pump house on top and the erection of a large elevated reinforced concrete reservoir. The work on the scheme was started in the middle of February 1940 and was completed by 1st April 1941. The work has been financed by the Government of India and the actual work constructed by the Bombay Public Works Department.

Mahableshwar.

The urgent necessity for providing good water supply and efficient drainage was impressed on the Municipality. Mahableshwar should move with the times. By the provision of a piped water supply Mahableshwar should attract more visitors and incidentally increase municipal revenue. As an instance, it was pointed out how Matheran had quadrupled the number of visitors since the installation of good water supply.

Inspected the Elphinstone Tank and the Bishop's Tank. They are reported to be leaky. Advised that the tanks should be emptied after the rains and the bottoms and sides should be re-plastered with 5 per cent. pudlo.

The Morarji Castle spring was noticed to be overflowing to the extent of about 8,000 gallons per day.

Suggestions for collecting the water of this spring and pumping it to a service reservoir, its chlorination and distribution to the bazar area and certain bungalows were offered.

Suggestions were made for improving the drainage, provision of septic tank, installation of incinerator etc. and designs supplied.

Malegaon.

The Municipality has drawn up a proposal for water supply to 40,000 souls at 20 gallons per head per day, basing river Mosum as the source of supply. Investigations by trial pits sunk in the bed of the river, however, disclosed that there is no subterranean supply sufficient for the requirement of Malegaon. In the hot weather months, the river dries up. The Municipality is therefore advised to base their proposals on the river Girna, which is a surer source and known to be perennial.

Nasik.

The shortage of water in Nasik during the hot weather is very acute and is having a bad effect on the prospects and health of the town principally. As it is a big centre of pilgrimage, both the quantity and quality of water have to be improved to cope with the present demand. A specially large fair is due in Nasik in 1945 and the Municipality has been advised to work up proposals to include the following works:—

(1) Impounding works for storing 126 million cubic feet of water at a new site.

(2) A gravity main, 30″ diameter, from storage reservoir to filter plant about 14 miles long.

(3) Provision of coagulation tanks and rapid filters on high elevated ground.

(4) 24″ diameter gravitation main from filters to existing reservoirs.

As an emergency measure, the Municipality has been advised to go ahead at the existing headworks with some of the urgent improvements of laying an additional porous pipe gallery, 200 feet long in the bed of the river, erection of a new oil pumping plant to lift 100,000 gallons of water per hour against a head of 250 feet, the replacement of the 12″ C. I. rising main by an 18″ diameter Hume steel main and relaying the salved 12″ pipes to improve the distribution system in the town. The Municipality has prepared estimates of the cost of these inprovements amounting to Rs. 3,86,000 and the same is being scrutinised in the Consulting Public Health Engineer's office. This first stage of the work should be completed by X'mas 1941. The storage of water is now ample for present requirements in the Godavari river at the existing headworks due to bunding the spans of the road bridge on the Bombay-Agra Road at Nasik, about 3 miles downstream and sufficient water is now available for supply to the existing reservoirs.

Pandharpur.

The town is supplied with plenty of pure water properly sterilised at the service reservoir. As it is a pilgrim centre, all the

works except the distribution system are maintained by Government. This water is sold to the Municipality, at about 3 annas per 1,000 gallons, which is a very cheap rate. The Municipality has prepared plans and estimate for overhauling the distribution system to improve pressures and distribution of water, as well as for a comprehensive drainage including disposal works. Each scheme costs about Rs. 3 lakhs. These schemes have been approved by the Board of Public Health Works and are waiting to be financed and executed.

Parola.

The Municipality are contemplating to inaugurate a potable water supply scheme in the town. They wished to have a gravitation scheme to save recurring cost on pumping. With this end in view, the Mhaswad Tank source was examined and was found to be impracticable. Two other sources were therefore examined :—

(1) Infiltration works in the bed of the Bori river;

(2) Infiltration wells in the bed of the Bhokarbari nalla.

Either scheme is estimated to cost about Rs. 2 lakhs. The Municipality have no funds. If present taxation is increased, which is very low, the scheme can be financed from loan to be raised in the open market. The Municipality was advised as to the procedure they should adopt if they desire that the work should be taken up by Government agency.

Poona City.

The water supply to Poona City is capable of considerable improvement. The water supplied to the population of about 180,000 souls is from the Mutha Right Bank Canal, and this water is *unfiltered.* Attempts are made to clarify this water during the monsoon, but it is difficult to obtain satisfactory results with the works as now constructed. During certain times of the year the canal is closed and the public suffer great inconvenience owing to cutting off of the water supply, and in case of a fire, a major disaster may result one day. To rectify this unsatisfactory state of affairs, the Consulting Public Health Engineer has prepared a scheme for providing a piped water supply from Kharakwasla Lake to Poona City and for this water to be filtered *en route.* The main details of the scheme are to have pumping machinery at Kharakwasla Lake, which will discharge 16 million gallons of water per day into the purification works. Here the water will be filtered and sterilised and delivered through a 42″ diameter gravity main, which will supply the water at a high pressure near the Swar Gate outside Poona City. This gravitation main will then reduce in diameter to 27″ and will supply water to Poona and Kirkee Water Works. The total cost of the scheme is Rs. 46 lakhs. The actual cost of the water sold to the Municipality will only be 3 annas per 1,000 gallons and it is hoped that this scheme will receive sanction at an early date.

A schemeto provide water supply to the new Bhamburda Town Planning area has been taken up for construction by the Poona City Municipality. It is proposed to erect a high level water tank in a suitable position on the hill behind the Servants of India Society's Home and to pump water to it from a pumping station to which the existing water supply main running along the Fergusson College Road will be extended. From the reservoir, two distribution mains will be laid to localities which it is intended to serve. The scheme is estimated to cost Rs. 1 lakh.

Sangamner.

During hot weather period of almost every year, the town either actually suffers acutely for want of adequate water supply or is threatened with epidemics of all kinds due to polluted supply. A protected water supply is therefore its urgent need. The drainage of the town is also deplorable. The town has some surface drainage, but the gradients are deficient and the sections of drains square. This tends to much clogging. A comprehensive drainage scheme is an urgent necessity and it should precede water supply construction. The Municipality has, on the advice of the Consulting Public Health Engineer to Government, engaged a surveyor who is collecting necessary data for drawing up a combined water supply and drainage scheme. The perennial Pravara River should form the source of supply, as it will supply Sangamner with all the water they require.

Satara.

A detailed inspection of the aqueduct from the Kas storage tank supplying water to Satara town was made. It was pointed out that this duct, 16 miles long, loses nearly half the quantity by leakage and that some efforts should be made to line up the channel bit by bit each year and to obtain more water for the town, as the volume of water supplied to Satara will have to be considerably increased in the near future. The Municipality has therefore been strongly advised to proceed at once with the preparation of an estimate for either lining the canal with concrete and bitumastic or to fit pre-cast sections of a water channel made by the Gunite process. Samples of these have been made in the Poona Water Works and are to be inspected by the Municipality. The cost of the same is only about Rs. 12 per 6 ft. section and it would be desirable to line about 2 miles of the aqueduct this year, and if successful, the remaining part of the aqueduct can be constructed as funds permit.

The purification of the water ex the aqueduct is very faulty. Alum is being added to the water, but practically no benefit is being derived. This should be looked into and the alum treatment made successful. The Municipality was advised to get their samples of water analysed regularly every month in the Government Public Health Laboratory, Poona, and obtain expert opinion about the dose of chlorine, lime and alum to be administered.

Brown settled water is delivered through a 4″ diameter pipe to settling tanks and slow sand filters in Satara Camp. No attempt is made at settlement. As the pipe is too small to fill up the settling tanks, the P. W. D. were advised that the pure water tank should be divided into two compartments by constructing a partition wall so as to facilitate one part being cleaned out, while the other compartment supplied the camp.

The town's surface drainage was also inspected and it is hoped that the Municipality will prepare a complete scheme as per type sections of drains supplied and construct surface drains in stages and improve the general sanitation.

Sholapur.

The Municipality has been advised to survey a fresh source of supply to supplement the existing water supply from the Ekruk Tank for their prospective requirements in the next decade. They have been advised to provide all pure water reservoirs with a roof to prevent existing outside pollution. The present purification of the water was found to be faulty and detailed advice was given to improve the quality of water by installing filters.

Further work of laying distribution mains for providing water supply in Town Planning Scheme No. 2 was carried out. The work of constructing an additional high level reinforced concrete service reservoir of 1 million gallons capacity has been completed.

On the drainage side, the works of the Sadar Bazar Nalla sewer scheme and the Internal Main sewer scheme were in progress. The expenditure incurred on water supply and drainage were Rs. 89,951 and Rs. 55,513 respectively.

Yeola.

The site just below the Khirde-Sathe tank was inspected and was found to be suitable for supply of water to Yeola by gravity. Samples of water from the wells at the proposed site have been analysed and found to be good. Yield tests have to be taken for sufficiency of water supply.

SOUTHERN DIVISION.

Belgaum.

Belgaum has a pleasant climate but has not a piped water supply. The Municipality has lately decided to revise the water supply scheme prepared in 1918 with the site of headworks at Rakaskope, about 12 miles from the town and has deposited the necessary funds with Government. It is proposed to put up an earthen dam, 1,200 feet long between two hills to impound about 191 M.cft. of water. The scheme is designed to supply 20 gallons per head per

day to the prospective population of 68,000 souls within municipal limits. The revision of the project is entrusted to the Executive Engineer, Belgaum Division, at a cost of about Rs. 10 lakhs.

Bijapur.

The Bhutnal storage reservoir was inspected. The raising of the waste weir has been completed. A very large volume of water was observed to be leaking from the dam and running down to waste through the drains of the tank. The percolated and pure water should be collected in a reinforced concrete tank and delivered to the outlet from the slow sand filters before chlorination. This large volume of water would help to reduce the draw off from the tank. The slow sand filtration was found to be faulty and to have outgrown its capacity. The Municipality has been advised to take out all sand and convert these filters into settling tanks for the use of alum treatment. The present water supply to the town is coloured and the dose of chlorine high. Detailed instructions were given to improve the quality of water.

It was surprising to see so many excavations with stagnant water in them and in the evening there were millions of mosquitoes buzzing about this area. It is therefore suggested that after the monsoon these small ponds should be pumped out by means of a portable pumping plant, and this should be purchased from a Bombay firm. The Dapuri Workshops have lately purchased one for the works in Poona at a cost of Rs. 2,000 and this would be about the size required for this work. The Municipality should complete the outfall drain and take the sullage outside the town wall in the first instance. Thereafter, the sullage should be disposed of on land, after passing it through a settling tank for sedimentation and thinning out of the sullage. There are many hollows near the town moat outside the wall, which causes water to stagnate and breeds mosquitoes.

During the year under report, the work of completing the 16" diameter new delivery pipe connection to the rising main for the Bijapur Water Works was carried out by the Executive Engineer, Bijapur Division, with the help of the expert mechanics from the Poona Water Works at a cost of Rs. 2,976.

Dharwar.

Water supply to this town is most inadequate. In years of late or deficient rains, there is no water supply for 3 to 12 weeks at a stretch and people have to obtain supplies from wells, and this water is at times polluted and unpleasant. The main requirement of Dharwar is to find another catchment area so as to store water.

On the advice of the Consulting Public Health Engineer, the Municipality have recently purchased two sets of oil engines and centrifugal pumps, which are now being erected and will replace the old obsolete steam plant installed in 1911. The work of

enlargement of the rising main by 12″ diameter C. I. pipes is now taken up for execution by the Municipality. The Municipality should also prepare soon a comprehensive surface drainage scheme and take it up for execution in stages side by side with improvements to water supply. This would avoid water logging and breeding of mosquitoes in the town area and would make the town sanitary.

Hubli.

The volume of water supply to this important town is a mere 9 gallons per head per day, which is a very meagre water supply. There is about 2 years water supply available in Unkal Lake and this storage is necessary as a safeguard against any failure of the rains in any one year. The Administrator of the Municipality has been advised to employ a Special Engineer to develop a comprehensive scheme of water supply and drainage. This Engineer has been appointed and the scheme is under preparation. Briefly, the scheme is to find a site on one of the rivers and to build an earthen dam with waste weir, secondly, to install bigger pumping plant and thirdly, to increase the diameters of the distribution mains in the town so as to convey more water to the people. A start has been made by the purchase of one new oil engine pumping set, which will replace the old steam engine pumping set which was expensive to run and likely to break at any time.

When the new comprehensive scheme has been prepared, it is hoped that the Municipality will take the work in hand as soon as the members come back to office.

Nipani.

With the growth of population and more demand for water, the existing water supply works at Nipani have proved to be inadequate. At the instance of the Municipality, a scheme for impounding reservoir on the Shirguppi Nala with provision for a masonry dam and pumping was worked out, but the cost of the same proved prohibitive. The Yernal storage scheme with earthen dam by gravity was also worked out and the cost of this too proved to be Rs. 5 lakhs and over. During the recent inspection, the Municipality was advised to sink three 8″ diameter bores behind the Nipankar's Tank, as there is likelihood of tapping a supply of water from the hills behind. The expenditure on one bore will be about Rs. 5,000, and the bores should be put down early. The Municipality was also advised to dismantle part of the infiltration gallery and rebuild the same so as to make it water tight on the downstream side. At present water is infiltrating into this aqueduct and is leaking on the opposite side. If Rs. 10,000 are spent on this work, the present water supply to the town will be considerably improved. The main defect in the existing water supply is that the old 4″ C. I. pipe was laid above hydraulic

gradient. 9″ Hume pipe has been suggested to replace the old 4″ C. I. pipe. After these improvements have been carried out, the proposal for the Shirguppi tank should be considered. The local body is preparing the plans and estimates accordingly and has applied for permission to raise a loan in the open market.

Panvel.

The present water supply is only about 70,000 gallons per day, which supplies about 7·25 gallons per head for the existing population of 9,000 souls. Under instructions from the Consulting Public Health Engineer, the Municipality are putting up proposals for increasing the volume of water supplied to the town. They consist of lengthening the infiltration aqueduct, building a weir across the river, increasing the diameter of the trunk main from the headworks to the town, building an elevated service reservoir and laying new distribution piping. This scheme which is estimated to cost Rs. 2,78,000 will shortly be submitted for the consideration of the Board of Public Health Works.

Among other places inspected are :—

Matheran,

Dharangaon,

Vautha in Ahmedabad district,

Gadegaon in Pandharpur taluka,

Dakor,

Ratnagiri,

Khed,

Chiplun,

etc., etc., and suitable advice tendered.

10. Fees are now levied by the Consulting Public Health Engineer, *vide* Appendix III. The total amount of such fees recovered during the year and credited to Government amounted to Rs. 5,948, and a further Rs. 16,000 are owing in payment of services rendered and are expected to be received shortly.

11. Government has lately reduced the fees for the inspection of mechanical pumping plants by the Mechanical Assistant of the Consulting Public Health Engineer and already a notable improvement is seen in the general upkeep of the pumping stations. In the past municipalities have not paid as much attention as they should do to the proper upkeep of pumping stations, and upon this depends the maintenance of proper water supplies as well as reduction in pumping expenses. Any municipalities that have not availed themselves of the services of the inspection of the Mechanical Assistant, should do so early.

Most distribution systems leave much to be desired. In many towns records have not been correctly maintained and in some cases are chaotic. Extensions are usually carried out haphazardly and branch mains overloaded with numerous connections instead of duplicate mains being laid. The Consulting Public Health Engineer reports that there has been a general awakening in most municipalities in sanitary matters, and they seem now keen to have better water supplies plus drainage.

U. N. MAHIDA,

Deputy Secretary to Government,
Public Works Department, Irrigation and Railways,
and
Member and Secretary, Board of Public Health Works.

APPENDIX I.

PERSONNEL OF THE BOARD OF PUBLIC HEALTH WORKS, PROVINCE OF BOMBAY, AS IT STOOD ON 31ST MARCH 1940.

President.

The Commissioner, Central Division.	Mr. **D. MacLachlan**, I.C.S.

Official Members.

The Secretary to Government, General Department.	Mr. K. L. **Panjabi**, B.A., I.C.S.
The Secretary to Government, Public Works Department.	Mr. C. E. **Aitken**, B.Sc. (Edin.), I.S.E.
The Director of Public Health for the Government of Bombay.	Lt.-Col. A. Y. Dabholkar, M.C., M.B.B.S., B.Sc. (Bom.), D.P.H., D.T.M. & H. (Lond.), I.M.S.
The Consulting Surveyor to Government.	Mr. G. B. Soparkar, L.C.E., F.S.I., A.M.T.P. Inst. (Lond.).
The Consulting Public Health Engineer to Government.	Mr. R. A. Collett, M.Inst.C.E., M.R.San.I., M.Inst.W.E.

Non-Official Members.

Mr. B. B. Chakranarayan, M.L.A.

Dr. P. G. Solanki, L.M. & S.. M.L.C.

Official Member and Secretary.

The Deputy Secretary to Government, Public Works Department, Irrigation and Railways.	Mr. U. N. Mahida, B.E., J.P., I.S.E.

U. N. MAHIDA,

Deputy Secretary to Government,
Public Works Department, Irrigation and Railways,
and
Member and Secretary, Board of Public Health Works.

APPENDIX II.

PUBLIC HEALTH ENGINEERING SCHEMES APPROVED BY THE BOARD OF PUBLIC HEALTH WORKS DURING THE YEAR 1939-40.

The following projects were approved and execution of the same authorized by the agency noted against each :—

Name of Project.	Estimated cost.	Agency of Execution.
	Rs.	
1. Construction of a Feeder channel from the Padugonda Tank to the Halbhavi Tank at Nargund.	9,212	Not known.
2. Santa Cruz and Danda Drainage ...	6,39,963	Bandra Municipality.
3. Chiplun Water Supply—Stopping of leakage and increasing storage of Kamta Tank.	5,470	Executive Engineer, Ratnagiri Division.
4. Bijapur Water Supply—Connecting the rising main with the new pumping plant.	2,440	Executive Engineer, Bijapur Division.

U. N. MAHIDA,

Deputy Secretary to Government,
Public Works Department, Irrigation and Railways,
and
Member and Secretary, Board of Public Health Works.

APPENDIX III.

SCALE OF FEES IN RESPECT OF PREPARATION, SCRUTINY, EXECUTION AND INSPECTION OF PUBLIC HEALTH SCHEMES CARRIED OUT BY GOVERNMENT AGENCY.

(1) *For preliminary investigation and report.*—For a local body—no charge. For an outside body—the daily pay of the officer making the investigation and the staff which accompanies him from the date of leaving headquarters till the date of return *plus* 50 per cent. for a period not exceeding seven days.

For periods in excess of seven days, the charge will be as above for the first seven days, and thereafter the daily pay of the officer making the investigation and staff which accompanies him *plus* 100 per cent.

In all cases the travelling and halting allowances of the Consulting Public Health Engineer and his staff will be paid by the local or outside body concerned.

(2) *For carrying out detailed surveys in connection with a project.*—The estimated cost of the survey, including cost of establishment to be engaged, shall be recovered.

(3) *For preparation of a project complete with all necessary drawings and estimates.*—2½ per cent. of the estimated cost less the amounts paid under (1) and (2) above.

(4). *For scrutiny by the Consulting Public Health Engineer of a project prepared for a local or outside body by an agency other than the Public Works Department.*—1¼ per cent. of the estimated cost of the project.

(5) *Inspection by the Consulting Public Health Engineer to Government of Public Health Works under construction, if constructed by an agency other than the Public Works Department.*—1¼ per cent. of the actual works outlay (exclusive of land compensation) of the project.

If the Consulting Public Health Engineer is asked to act continuously as consultant for any work and has accordingly to visit that work from time to time as it progresses, the total charge will be 1¼ per cent. of the actual works outlay (exclusive of land compensation) of the project. If at the request of the local body he pays an occasional visit only, the charge will be Rs. 100 *plus* the actual expenses to Government, i.e. travelling allowance under the ordinary rules; but no charge is made for visits made by the Consulting Public Health Engineer on his own initiative or for advice offered on such visits or for visits by the Engineers of local bodies to him at his office to consult him about any particular point that arises.

(6) *Construction of works by the Public Works Department on behalf of a local body.*—Establishment and tools and plant charges at 15 per cent. of the estimated cost of the project inclusive of 2½ per cent. for the preparation of plans and estimates.

U. N. MAHIDA,

Deputy Secretary to Government,
Public Works Department, Irrigation and Railways,
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Member and Secretary, Board of Public Health Works.

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